

NEW SPECIES OF *SMICRIDEA* (*RHYACOPHYLAX*) (TRICHOPTERA: HYDROPSYCHIDAE) FROM COSTA RICA¹

Ralph W. Holzenthal, Roger J. Blahnik²

ABSTRACT: Three new species in the caddisfly genus *Smicridea*, subgenus *Rhyacophylax*, are described from Costa Rica and 25 additional species in the two recognized subgenera are recorded from the country. Illustrations of the male and female genitalia and wing coloration are provided for each of the new species along with a map of their distributions. Two of the new species, *S. singri* and *S. nemorosa*, are in the *signata* species group, and the third, *S. tapanti*, is a member of the *peruana* species group.

Since 1986, the authors have been involved in a nationwide inventory of the Trichoptera of Costa Rica. Not surprisingly, during the course of this survey, many previously undescribed species have been discovered, including three in the genus *Smicridea*, subgenus *Rhyacophylax* Müller. Concurrently with our survey, John K. Jackson and Bernard Sweeney, Stroud Water Research Center, Avondale, Pennsylvania, have been investigating the ecology of the aquatic insects of Guanacaste National Park, in the northwestern corner of Costa Rica. A *Smicridea* species encountered in the aquatic insect rearing program of Jackson and Sweeney is the same as one of the new species captured during our inventory. We are taking this opportunity to describe this new species, along with the two others, so that binomens are available for use by ecologists and others interested in the caddisfly fauna of Costa Rica.

The genus *Smicridea* is diverse and abundant throughout the Neotropical realm, ranging from the southwestern United States to extreme southern South America; it is also found through the Antilles. Important papers on the taxonomy and diversity of the genus include those of Blahnik (1995), Flint (1968, 1974a, 1974b, 1981, and 1989), and Flint and Denning (1989). Wiggins (1977) provided a detailed account of the larval morphology, yet little is known about larval biology. Larvae we observed in Costa Rica constructed typical hydropsychid retreats and capture nets which they undoubtedly use to filter organic matter suspended in the water. Two subgenera are recognized, *Smicridea* Mac Lachlan and *Rhyacophylax* Müller, containing 92 and 57 species, respectively. With the description below of three new species, 28 are now known from Costa Rica. The 25 previously described Costa Rican *Smi-*

¹ Received March 19, 1995. Accepted April 11, 1995.

² Department of Entomology, 219 Hodson Hall, 1980 Folwell Ave., University of Minnesota, St. Paul, Minnesota 55108, USA.

cridea include, in *Rhyacophylax*: *acuminata* Flint 1974, *bifurcata* Flint 1974, *murina* Mac Lachlan 1871, *radula* Flint 1974, *signata* (Banks) 1903, and *talamanca* Flint 1974, and in *Smicridea*: *aries* Blahnik 1995, *bivittata* (Hagen) 1861, *breviuncata* Flint 1974, *catherinae* Blahnik 1995, *fasciatella* Mac Lachlan 1871, *filicata* Flint and Denning 1989, *gemina* Blahnik 1995, *gomezi* Blahnik 1995, *gomphotheria* Blahnik 1995, *holzenthali* Flint and Denning 1989, *hybrida* Blahnik 1995, *matagalpa* Flint 1974, *mirama* Flint and Denning 1989, *multidens* Flint and Denning 1989, *polyfasciata* Martynov 1912, *sirena* Bueno 1986, *turrialbana* Flint 1974, *ulva* Flint 1974, and *varia* (Banks) 1913.

Smicridea (Rhyacophylax) nemorosa, NEW SPECIES

Figs. 1, 4, 8, 10

This new species is closest *S. (R.) salta*, with which it shares the sharp spur on the ventral margin of tergum X and the long thin retractile structures of the phallus. It differs from *salta* in that the apex of the phallus has a pair of ventrolateral lobes and a single, pointed mesoventral lobe; in *salta* the ventrolateral lobes are not present and the mesoventral lobe is rounded apically.

Adult: Forewing length 4.5 mm. Color overall pale stramineous; forewing (Fig. 8) with dark marks along chord and over radial and thyridial nygmata, apex of wing with darker setae and light subterminal band, bordered basally by slightly darker setae. Sternum V in male with anterolateral glandular process almost twice as long as sternum; about half length of sternum in female. **Male genitalia:** Segment IX with anterolateral margin produced into a pointed, upturned lobe. Tergum X, in lateral aspect, with tip rounded, not upturned, bearing tiny setae; apicodorsally with wart bearing 4-6 long setae; ventrolateral margin of X bearing single, mesal, spinelike projection; apex of X divided to full length of tergum. Inferior appendages two-segmented; basal segment long, slightly inflated preapically, covered with setae, apicodorsal setae long; apical segment short, apex rounded in dorsal and lateral aspects. Phallic apparatus tubular, basal section enlarged and meeting apical section at about 130°; apex of phallus with paired ventrolateral, slightly upturned lobes and pointed mesoventral lobe; apically with retractile structure composed of two very slender, slightly sinuate, sclerotized rods and single, long, keel-like structure. Dorsal periphallial membranes very small, indistinct. **Female genitalia:** Sternum IX divided, each sternal plate very acute posteriorly, setose, adjacent pleural membrane setose. Internal plate (*sensu* Flint 1974), in ventral aspect, elongate, lyre-shaped, in caudal aspect U-shaped. Vaginal apparatus with anterior bar narrow; anteromesally without sclerotized plates, this region highly membranous.

Holotype. ♂: COSTA RICA: *Alajuela*: Reserva Forestal San Ramón, Río San Lorencito and tribs., 10.216°N, 84.607°W, el. 980 m, 6-10.iii.1990, Holzenthal, Muñoz, Huisman (NMNH).

Paratypes: COSTA RICA: *Alajuela*: Quebrada Latas, 8.9 km NE Bajos del Toro, 10.269°N, 84.260°W, el. 1030m, 6.ix.1990, Holzenthal, Blahnik, Huisman; 10 ♂, 8 ♀ (UMSP); same data as holotype, except 30.iii-1.iv.1987, Holzenthal, Hamilton, Heyn, 1 ♂ (UMSP); same, except 28-30.vii.1990, Holzenthal, Blahnik, Muñoz, 1 ♂, 5 ♀ (UMSP); same, except 6-10.iii.1990, Holzenthal, Muñoz, Huisman, 5 ♂, 2 ♀ (UMSP); Río Sarapiquí, ca. 2 km SE Cariblanco, 10.299°N, 82.172°W, el. 710 m, 22.vi.1986, Holzenthal, Heyn, Armitage, 3 ♂ (INBIO); *Guanacaste*: Par-

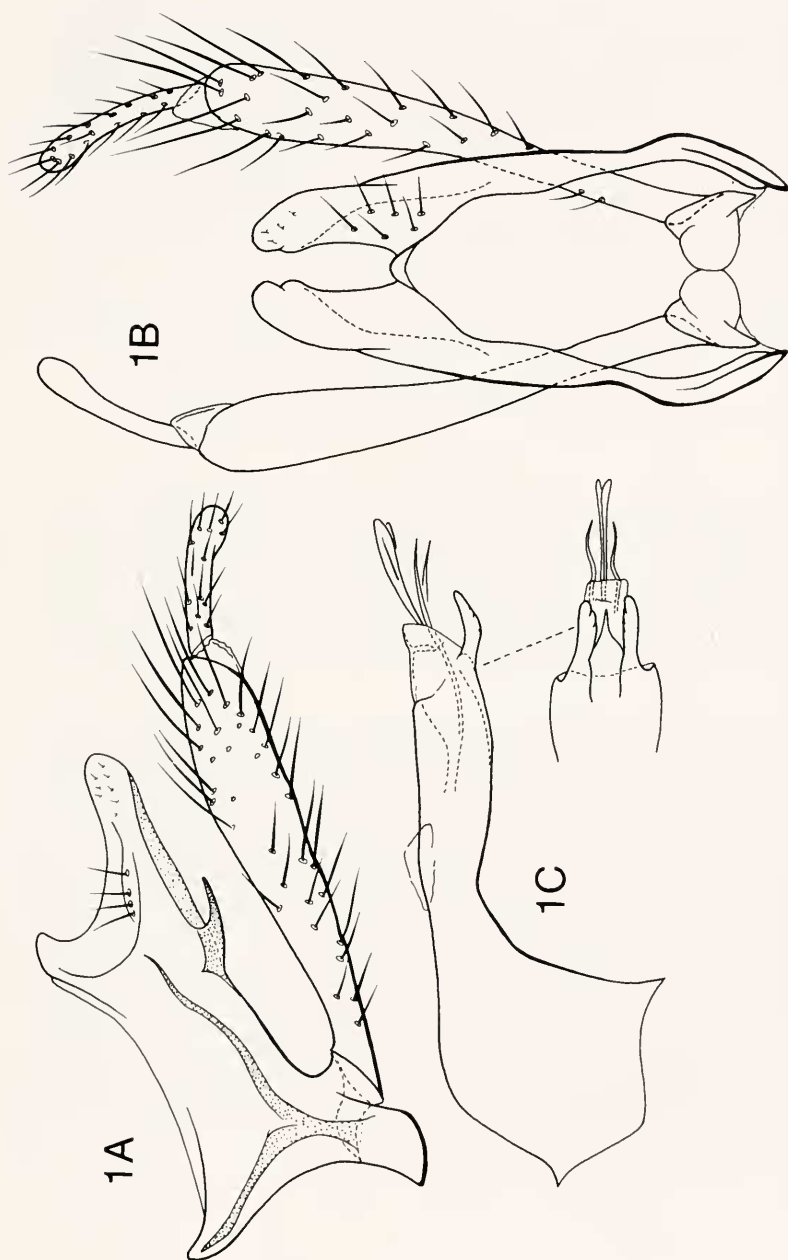


Fig. 1. *Smicridea (Rhyacophylax) nemorosa*, new species, male genitalia: A, segments IX, X, lateral; B, same, dorsal; C, phallic apparatus, lateral (inset, apex of same, ventral).

que Nacional Guanacaste, Maritza. Río Tempisquito, 10.958°N, 85.497°W, el. 550 m, 19-20.vii.1987, Holzenthal, Morse, Clausen, 20 ♂, 15 ♀(UMSP); same, except 30-31.viii.1990, Huisman, Blahnik, Quesada, 24 ♂, 8 ♀(UMSP); *Heredia*: P[arque] N[acional] Braulio Carrillo, Est[ación] El Ceibo, Río Peje, 10.327°N, 84.078°W, el. 480 m, 29-31.v.1990, Holzenthal, Blahnik, Muñoz, 11 ♂, 4 ♀(UMSP); same, except Est[ación] Magsasay, Río Peje, 10.402°N, 84.050°W, el. 130 m, 25-26.viii.1990, Holzenthal, Blahnik, Huisman, 1 ♂, 4 ♀(UMSP); *Limón*: Parque Nacional Braulio Carrillo, Quebrada Gonzalez, 10.160°N, 83.939°W, el. 480, 12-14.v.1990, Holzenthal & Blahnik, 22 ♂, 1 ♀(UMSP); *Puntarenas*: Río Guinca, ca. 1 km (air) E Finca Helechaes, 9.076°N, 83.092°W, el. 840 m, 22 ii.1986, Holzenthal, Morse, Fasth, 8 ♂, 2 ♀(NMNH); same, except 4.viii.1987, Holzenthal, Morse, Clausen, 3 ♂, 8 ♀(UMSP); *San José*: P[arque] N[acional] Braulio Carrillo, Est[ación] Carrillo, Q[uebrada] Sanguijuela, 10.160°N, 83.963°W, el. 800 m, 27.iii.1987, Holzenthal, Hamilton, Heyn, 3 ♂, 6 ♀(UMSP).

Etymology. From the Latin, meaning full of woods, woodsy, or shaded, and in reference to the forested streams where the species was collected.

Smicridea (Rhyacophylax) singri, NEW SPECIES

Figs. 2, 5, 9, 10

This species appears to be a member of the *signata* group, where it is close to both *S. (R.) signata* and *S. (R.) bidactyla* Flint and Reyes. It shares with *bidactyla* the spinose ventrolateral margin of segment X of the male genitalia. However, in the new species these spines are of a different arrangement. With *signata* the new species shares serrate lateral lobes and the slightly sinuate, tongue-like apicoventral lobe of the phallus, although in the new species the serrate lateral lobes are preapical, not midlateral as in *signata*.

Adult: Forewing length 4.5 mm. Color overall pale stramineous; forewing (Fig. 9) with dark marks along chord and over radial and thyridial nygmata, apex of wing with darker setae and dark subterminal band, bordered basally by a band of light setae and another of slightly darker setae. Sternum V of male with anterolateral glandular process almost twice as long as sternum; about half length of sternum in female. **Male genitalia:** Segment IX with anterolateral margin straight. Tergum X, in lateral aspect, with tip narrowly produced into a rounded, slightly upturned lobe, bearing tiny setae; apicodorsally with wart bearing 4-6 long setae; ventrolateral margin of X bearing preapical series of 4 sclerotized, spinelike projections, one more basal than the other three; in dorsal aspect, apex of X divided to about half length of tergum. Inferior appendages two-segmented; basal segment long, slightly inflated mesally (when viewed laterally), covered with setae, apicodorsal setae especially long; apical segment short; apex rounded in dorsal and lateral aspects. Phallic apparatus tubular, basal section enlarged and meeting apical section at about 130°; with preapical, serrate, lateral lobes; apex sclerous, with projecting ventral lobe and emergent, apparently retractile, semimembranous, tubular projection, with elongate tapered, mesal, tongue-like projection, and paired basolateral, tapering, anteriorly directed projections. Dorsal periphallal membranes prominent. **Female genitalia:** Sternum IX divided, each sternal plate acute posteriorly, setose. Internal plate (*sensu* Flint 1974) in ventral aspect narrow; in caudal aspect V-shaped, with projecting apex. Vaginal apparatus with anterior bar narrow; anteromesally with pair of elongate, lightly sclerotized plates.

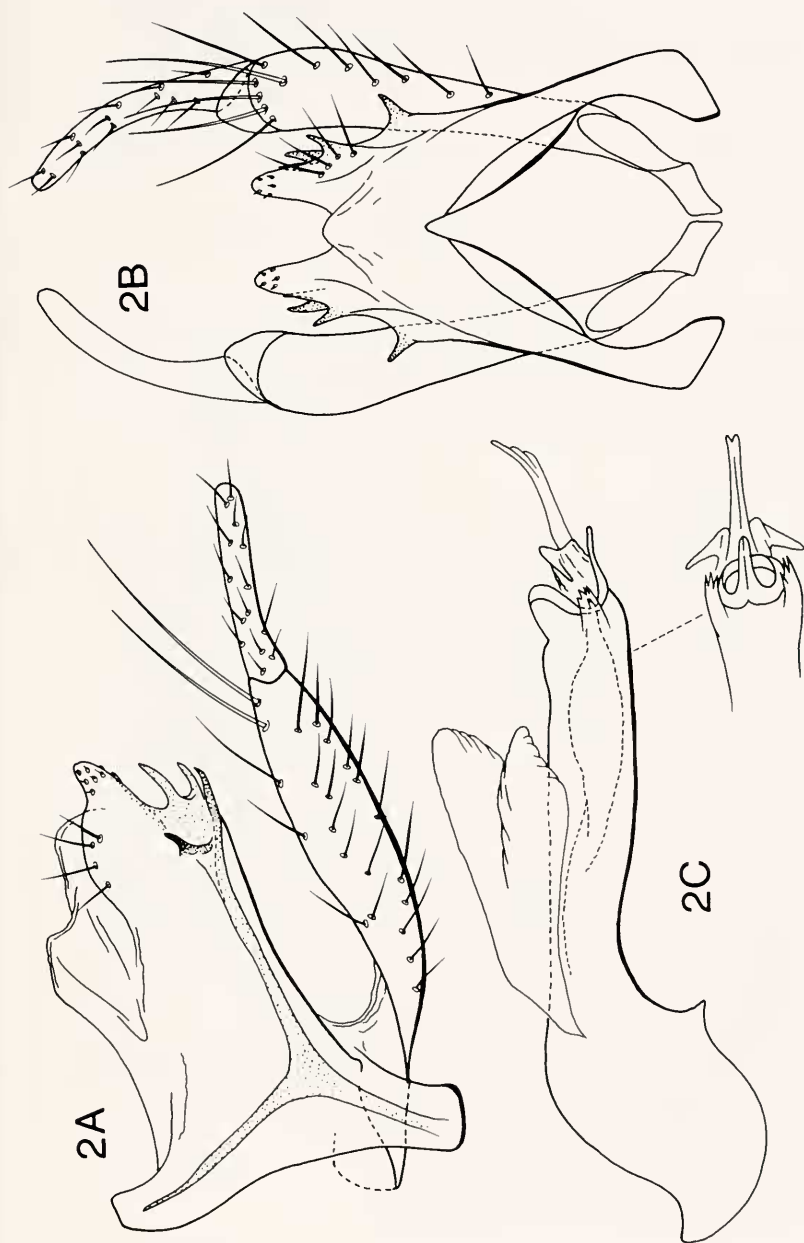


Fig. 2. *Smicridea (Rhyacophylax) singri*, new species, male genitalia; A, segments IX, X lateral; B, Same, dorsal; C, phallic apparatus, lateral (inset apex of same, ventral).

Holotype. ♂: COSTA RICA: *Puntarenas* Río Singrí, ca. 2 km (air) S Finca Helechales, 9.057°N, 83.082°W, el. 720 m, 21.ii.1986, Holzenthal, Morse, Fasth (NMNH).

Paratypes. Same data as holotype, 18 ♂, 3 ♀ (UMSP), 1 ♂, 1 ♀ (INBIO), 1 ♂, 1 ♀ (NMNH).

Etymology. Named for the type locality, in Costa Rica's Talamanca mountain range.

Smicridea (Rhyacophylax) tapanti NEW SPECIES

Figs. 3, 6, 7, 10

This new member of the *peruana* group is similar to *S. (R.) talamanca* and *S. (R.) acuminata*, perhaps being most closely related to the latter. The new species differs from *acuminata* in the shape of the phallic apparatus, being broader basally in the new species. The apex of the phallus also differs in its structural details between the species; in particular, *tapanti* lacks the spiculate sac found in *acuminata*.

Adult: Forewing length 7.5 mm (males), 9.0 mm (females). Color overall pale stramineous; male forewing (Fig. 7B) with dark marks along chord and over radial and thyridial nygmata, apex of wing with darker setae and light subterminal band, bordered basally by slightly darker setae; female wing with same pattern of coloration, but much darker overall (Fig. 7A). Sternum V of male with anterolateral glandular process almost twice as long as sternum; about half length of sternum in female. **Male genitalia:** Segment IX with anterolateral margin only moderately produced, highly membranous anterodorsally, with sclerous, dorsomesal prominence. Tergum X, in lateral aspect, with tip pointed, not upturned, apicodorsally with well defined wart bearing ~12 short setae; ventrolateral margin of X strongly sclerotized, but without spinelike projections; apex of X narrowly divided to about half length of tergum. Inferior appendages two-segmented; basal segment long, parallel sided, covered with setae, apical setae longest; apical segment short, apex rounded in dorsal and lateral aspects. Phallic apparatus tubular, basal section very enlarged and meeting apical section at about 100°; apex of phallus with paired ventrolateral, upturned lobes bearing tiny spicules, spicules also present middorsally; apex, in ventral aspect, with dorsomesal, lightly sclerotized lobe; internally, in lateral view, with slender, slightly sinuate, internal process, in ventral aspect widened preapically. Dorsal periphallial membranes absent. **Female genitalia:** Sternum IX divided, each sternal plate truncate posteriorly. Internal plate (*sensu* Flint 1974), in ventral aspect, broad, lyre-shaped, in caudal aspect π -shaped. Vaginal apparatus with anterior bar very broad, with lateral edges crenulate; anteromesally with heavily sclerotized, elongate dorsal plates; ventrolaterally with lightly sclerotized mesal and lateral areas.

Holotype: ♂: COSTA RICA: *Cartago*: Reserva Tapantí, Quebrada Palmitos and falls, 9.72°N, 83.78°W, el. 1400 m, 24-25.iii.1991, Holzenthal, Muñoz, Huisman (NMNH).

Paratypes: COSTA RICA: *Cartago*: Reserva Tapantí, Río Grande de Orosi 9.686°N, 83.756°W, el. 1650 m, 8-9.vii.1986, Holzenthal, Heyn, Armitage, 3 ♂, 2 ♀ (UMSP), same data as holotype, except Holzenthal, Blahnik, Muñoz, 2-3.vi.1990, 3 ♂, 2 ♀ (UMSP), 1 ♂, 1 ♀ (INBIO); same, except 24-25.iii.1991, Holzenthal, Muñoz, Huisman, 2 ♂, 5 ♀ (UMSP).

Etymology: Named for Costa Rica's densely forested, very wet Tapantí National Wildlife Reserve, site of the type locality.

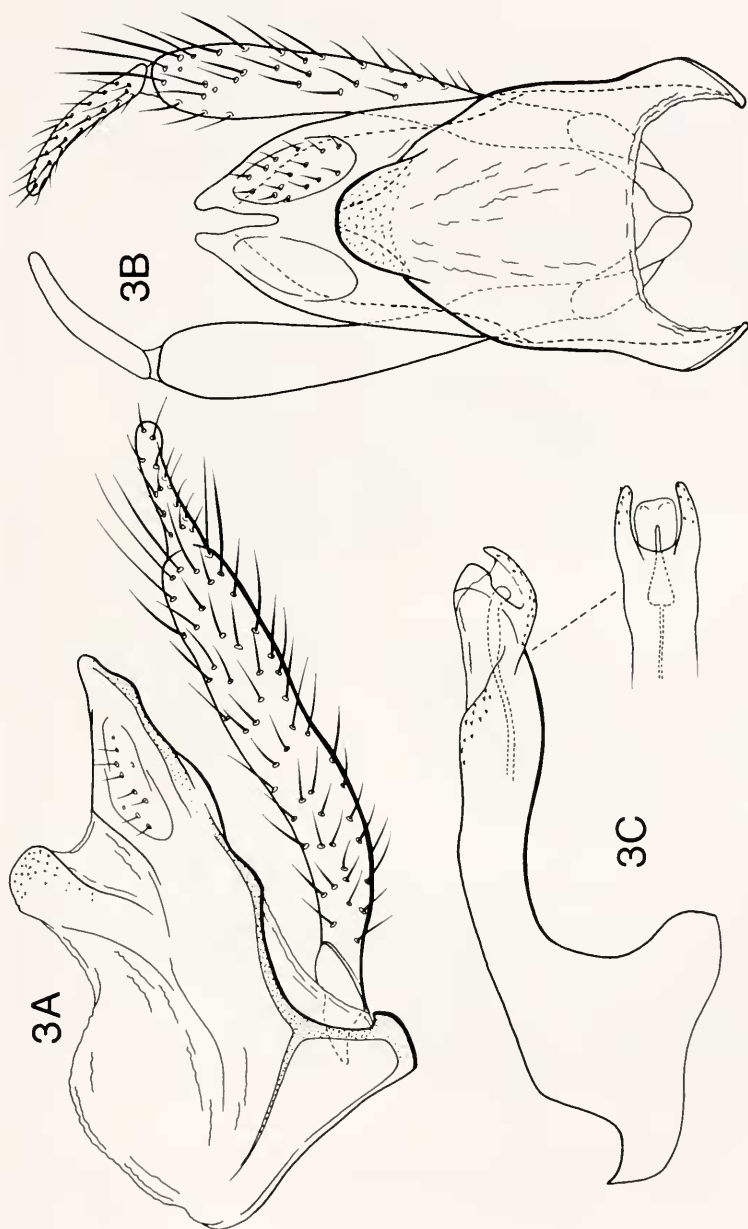
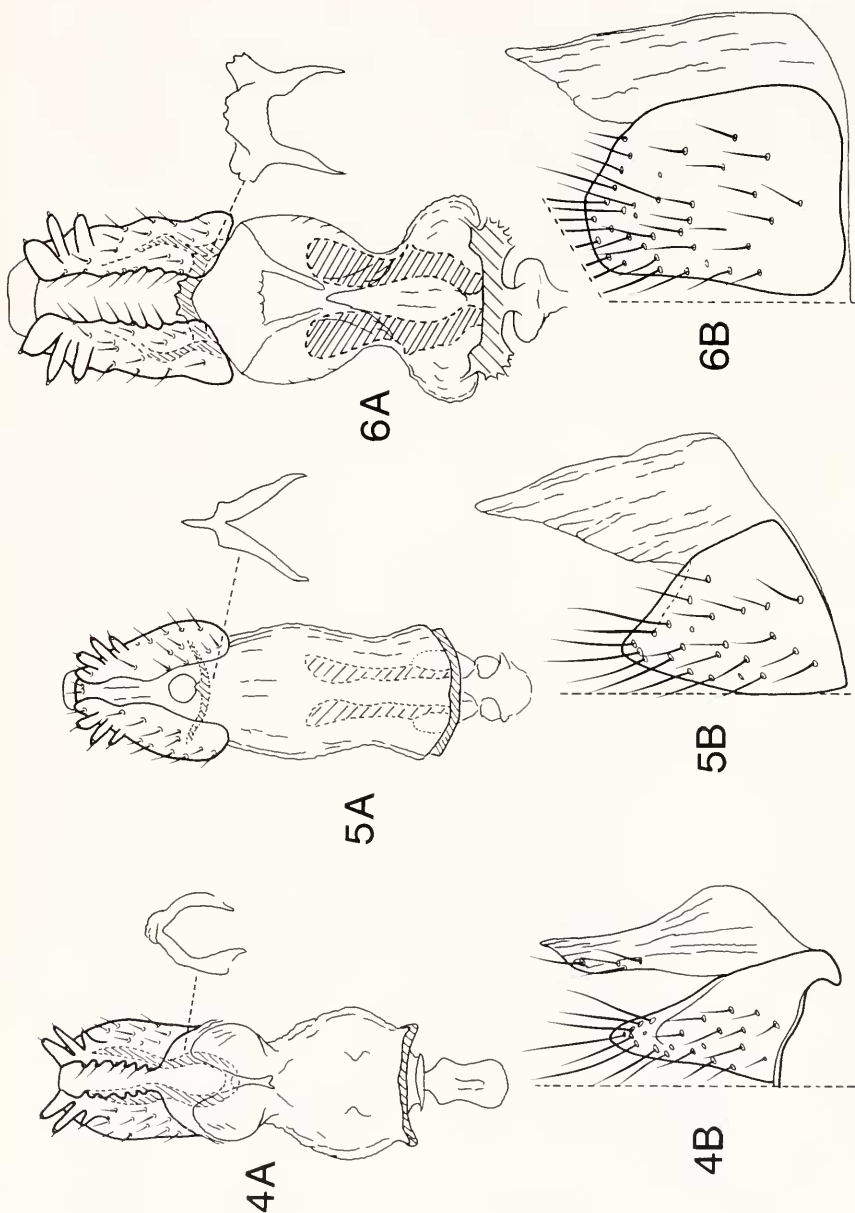
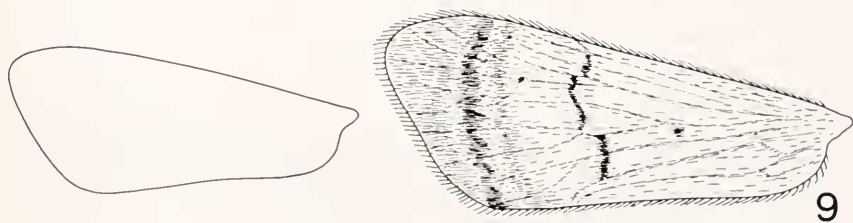
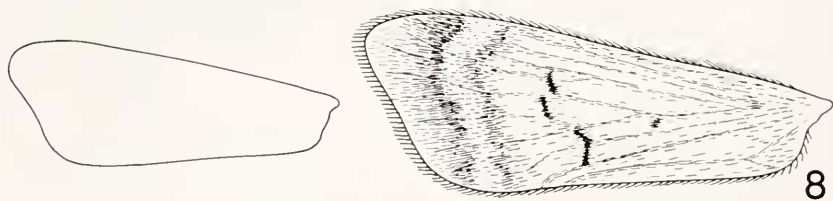
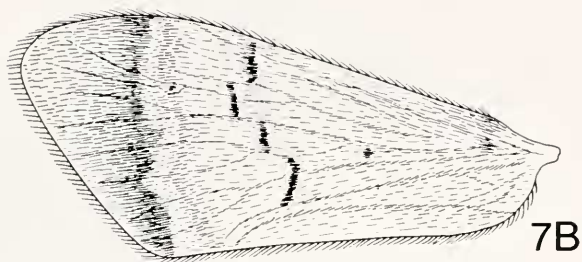
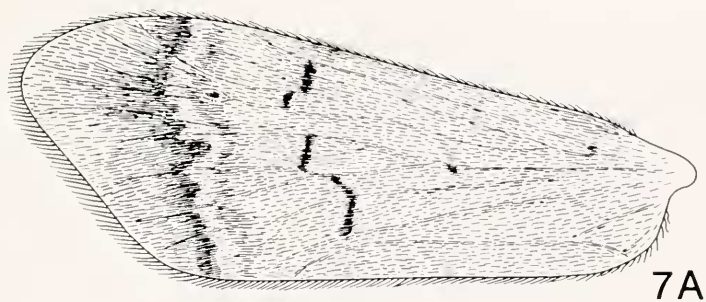


Fig. 3. *Smicridea (Rhyacophylax) tapanti*, new species, male genitalia; A, segments IX, X, lateral; B, same, dorsal; C, phallic apparatus, lateral (inset, apex of same, ventral).



Figs. 4-6. *Smicridea* (*Rhyacophylax*) new species, female genitalia, segments IX, X: A, vaginal apparatus, ventral, (inset internal plate, caudal); B, right sternite and adjacent pleural membrane, ventral. Fig. 4, *S. (R.) nemorosa*, new species. Fig. 5, *S. (R.) singri*, new species. Fig. 6, *S. (R.) tapanti*, new species.



Figs. 7-9. *Smicridea* (*Rhyacophylax*) new species, forewings. Fig. 7. *S. (R.) tapanti*, new species, A, female, B, male. Fig. 8. *S. (R.) nemorosa*, new species, male. Fig. 9. *S. (R.) singri*, new species, male. Wing outlines in Figs. 8, 9 same scale as in Fig. 7B.

COSTA RICA



Fig. 10. *Smicridea* (*Rhyacophylax*) new species, distribution.

ACKNOWLEDGMENTS

This research is based on support from National Science Foundation grants BSR-8917684 and DEB-9400632. We are especially thankful to Julie Janke, Afton, Minnesota, for the excellent illustrations of the wings. The encouragement of John K Jackson, Stroud Water Research Center, Avondale, Pennsylvania, is greatly appreciated. Paper No. 21,746, Scientific Journal Series, Minnesota Agricultural Experiment Station, St Paul, Minnesota.

LITERATURE CITED

- Blahnik, R. J.** 1995. New species of *Smicridea* (subgenus *Smicridea*) from Costa Rica, with a revision of the *fasciatella* complex (Trichoptera: Hydropsychidae). Jour. North Amer. Benthological Soc. 14(1): 84-107.
- Flint, O.S., Jr.** 1968. Bredin-Archbold-Smithsonian Biological Survey of Dominica, 9. The Trichoptera of the Lesser Antilles. Proc. U. S. National Museum, 125(3665): 1-60.
- Flint, O.S., Jr.** 1974a. Studies of Neotropical Caddisflies, XVII: The genus *Smicridea* from North and Central America (Trichoptera: Hydropsychidae). Smithsonian Contrib. Zoology 167: 1-65.
- Flint, O.S., Jr.** 1974b. Studies of Neotropical Caddisflies, XV: The Trichoptera of Surinam. Studies on the Fauna of Suriname and other Guyanas, 14(55): 1-151, plates 1-4.
- Flint, O.S., Jr.** 1981. Studies of Neotropical Caddisflies, XXVIII: The Trichoptera of the Río Limón Basin, Venezuela. Smithsonian Contrib. Zoology, 330: 1-61.
- Flint, O.S.** 1989. Studies of Neotropical Caddisflies, XXXIX: The genus *Smicridea* in the Chilean subregion (Trichoptera: Hydropsychidae). Smithsonian Contrib. Zoology 472: 1-113.
- Flint, O.S. Jr. & D.G. Denning.** 1989. Studies of Neotropical Caddisflies, XL: New species of *Smicridea* (*Smicridea*) from Middle America and the West Indies (Trichoptera: Hydropsychidae). Proc. Biological Soc. Washington, 102(2): 418-433.
- Wiggins, G.B.** 1977. Larvae of the North American Caddisfly genera (Trichoptera). Univ. Toronto Press, Toronto.